

### INTEGRATED ENERGY SYSTEMS — PRODUCTIVITY AND BUILDING SCIENCE PROGRAM

The New Buildings Institute's *Integrated Energy Systems — Productivity and Building Science Program* is dedicated to researching persistent building science questions and developing solutions with significant potential to save energy, improve indoor environmental quality and reduce operating and maintenance costs for building owners.

This three-year, \$6-million research effort, which is sponsored by the California Energy Commission's Public Interest Energy Research (PIER) program, consists of six distinct research elements. The program was launched in August 2000.

### Research Element #5: Integrated Design of Commercial Building Ceiling Systems

The *Integrated Design of Commercial Building Ceiling Systems* research element is a three-year study of how dropped "T-bar" acoustic tile ceilings can be designed to reduce energy consumption, increase task visibility, and improve safety while being easily specified and constructed in a repeatable manner.

The research has three components: 1) a study of the effectiveness of lay-in insulation in T-bar ceilings; 2) skylight performance testing (U-factor, solar heat gain coefficient, visible light transmission and photometrics); and 3) the development of a ceiling system protocol for quality lighting (including daylight) and energy savings.

Project budget: \$818,000

### Results

A skylight testing lab was custom built for this project and resulted in highly reliable and accurate measurements of performance. The lab design was also affordable and repeatable creating an unexpected market product from this research. Manufacturers of skylights, acoustic ceiling tiles, electric lighting and lighting software are also closely following this project, and several are already considering product changes based on this research.

The lay-in insulation segment of this element directly addressed the question: Should lay-in insulation over ceiling tiles be an accepted method of insulating the top surfaces of buildings? This research results contributed to a Title 24 standards proposal to eliminate this practice.

The skylight testing will provide thermal and visual performance data, as well as full photometric files for integration in lighting design software.

#### Key Research Milestones

Full Photometric Files on Selected Skylights  
Final report on the effectiveness of lay-in insulation  
Skylight performance test results  
Specification manual for integrated ceiling systems

#### Completion Date

Fall 2002  
Fall 2002  
Winter 2003  
Summer 2003

### Lead Personnel

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♦ Jon McHugh, Hescong Mahone, Element Lead ♦ Cathy Higgins, NBI Program Director ♦ Don Aumann, California Energy Commission Contract Manager ♦ Tait Solar Company ♦ Lighting Sciences Inc. ♦ Benya Lighting Design ♦ Cascadia Conservation

**For more information:** [www.newbuildings.org/pier](http://www.newbuildings.org/pier)  
[www.energy.ca.gov/pier/buildings](http://www.energy.ca.gov/pier/buildings)

